

# **Professional Foresters Registration Examination**

**APRIL 13, 2012**

## **PART I**

**Instructions: APPLICANTS, PLEASE READ THESE INSTRUCTIONS CAREFULLY. You MAY complete PART I by doing ONE of the following two options:**

**A) Complete the Short Answer Section (Question 1) and Any Two (2) of the Essay Questions (Questions II through V)**

## **OR**

**B) Complete Any Three of the Essay Questions (Questions II through V) and OMIT answering the Short Answer Question (Question I).**

Question I - Short Answer  
Question II - Forest Mensuration  
Question III - Forest Ecology  
Question IV - Silviculture  
Question V - Forest Protection

Professional Foresters Registration  
1416 9th Street, Room 1506-16  
Sacramento, CA 95814

**Answer on these pages, tear from the booklet and submit with the answer packet if you chose Option A for Part I of this examination.**

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**ACRONYMS AND ABBREVIATIONS USED IN THIS EXAMINATION**

The following Acronyms and /or Abbreviations **may be used** in this examination. Technical abbreviations that should be known by a forester are NOT included here (e.g. DBH, MAI, MBF). You may remove this page for reference throughout this examination. **It need not be returned.**

<b><u>Acronym or Abbreviation</u></b>	<b><u>Full Text</u></b>
BLM	Bureau of Land Management, USDI
BOF	California State Board of Forestry and Fire Protection
CCR	California Code of Regulations
CDFFP or CAL FIRE	California Dept. of Forestry and Fire Protection
CDF&G	California Department of Fish and Game
FPR	California Forest Practice Rules
PRC	California Public Resources Code
RPF	California Registered Professional Forester
THP	California Timber Harvest Plan
TPZ	California Timber Production Zone
USFS	United States Forest Service, USDA

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**QUESTION I - SHORT ANSWERS**

- 3%    1. List three (3) in-stream conditions that can negatively impact fish populations as a result of land management activities.
- 3%    2. A rectangular piece of land measures 26.5 chains by 38.7 chains. How many acres are in this piece of property?
- 3%    3. The THP is a part of a process that has been certified as \_\_\_\_\_ to an EIR subsequent to a decision by the Secretary of the California Resources Agency.
- 3%    4. What makes an orthophotograph different from other aerial photographs?
- 3%    5. Briefly discuss why a conventional high-lead logging system is not suitable for logging a partial cut on steep terrain.

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3%     6. You wish to thin a stand of trees to an average 24 ft x 24 ft square spacing. How many trees per acre would your thinned stand have on the average acre?

3%     7. According to the CDFFP guidance concerning large old trees, what is the smallest stand size area that must be disclosed in a THP when large old trees are present and potential significant adverse impacts pertaining to large old trees may occur?

4%     8. Give the common name of two deciduous, western U.S. forest tree species that are monoecious and two that are dioecious:

3%     9. What is the "coefficient of variation" used to measure?

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3%      10. What was the impetus (main reason) for California changing to the Yield Tax on timber in 1976??

2%      11. For a project on private lands in California, briefly describe the current procedure to obtain a spotted owl database check.

3%      12. According to the definitions in the FPR (CCR 895.1), what stream order is required for a planning watershed and generally what is the maximum acreage for a planning watershed?

3%      13. According to the California Code Of Regulations, which silvicultural method is used to develop an uneven aged stand from a stand that currently has an unbalanced irregular or even-aged structure? This method is used no more than twice to increase stocking and improve the balance of age classes so as to allow the residual stand to be managed by selection or group selection.

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- 3%     14. Typically, riparian vegetation is more important as a source of energy "inputs" in the headwaters areas of California and other western U.S. rivers than towards the lower end. Briefly explain why.
- 2%     15. Certification of forestlands to attest that the management of such lands meets approved standards of an designated authority is common today. Give the **complete name** of two certification programs currently being used in the **United States**.
- 3%     16. Water bodies that are listed as impaired under Sec. 303(d) of the Federal Clean Water Act, must have a plan called a \_\_\_\_\_ developed for each pollutant which is a calculation of the maximum amount of a pollutant that a water-body can receive and still meet water quality standards.
- 2%     17. The height above ground or (in some regions) above stump height, to which a tree stem is salable for a particular product is commonly termed \_\_\_\_\_ height.
- 2%     18. The difference between the greater volumes actually sawn over the lesser-estimated log scale volume is called \_\_\_\_\_
- 3%     19. An eight-digit code (e.g.17040206) that uniquely identifies any of the drainage basins in the United States in a nested arrangement from largest (Regions) to smallest (Cataloging Units) is called a \_\_\_\_\_.
- 3%     20. Describe the Allowable Cut Effect.

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- 3%     21. Under the California Forest Practice Rules, what conditions would a cable road need to have erosion control measures specified in the THP and installed?
- 2%     22. The establishment of a forest or stand in an area where the preceding vegetation or land use was not forest is called \_\_\_\_\_ .
- 3%     23. List three compatible uses, besides tree growing and harvesting, that may occur on lands zoned TPZ, according to the California Yield Tax Law (disregard local or county defined compatible uses).
- 3%     24. For tax purposes, the cost of logging equipment is usually recovered by depreciation and timber is depleted. By what taxation process is the cost of permanent roads most often recovered by the forest enterprise?
- 3%     25. Define direct and indirect control of insects.

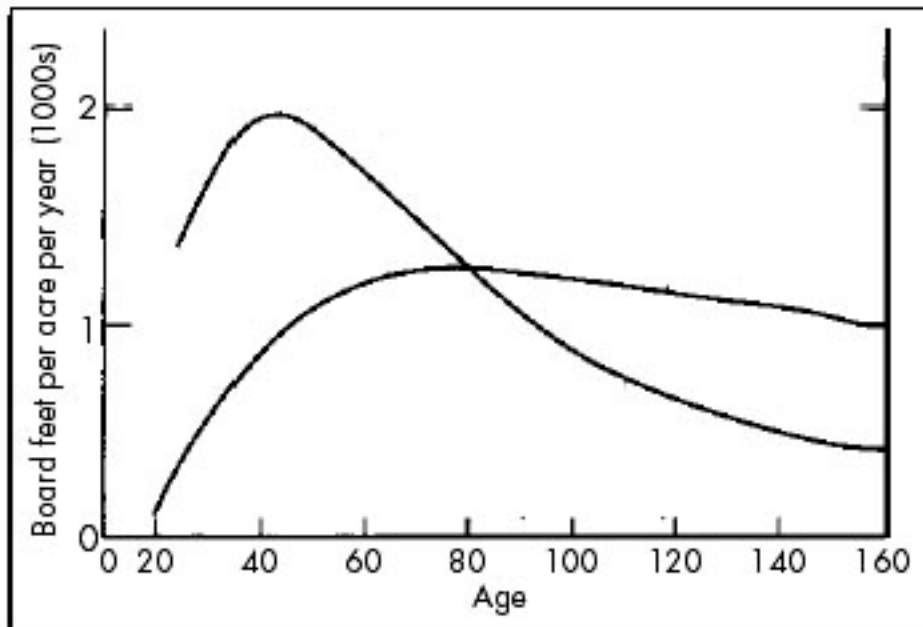
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2%    26. The abiotic parts of an ecosystem can generally be defined as

2%    27. On the graph below, label the graph line that represents Periodic Annual Increment growth (PAI).



4%    28. According to the definition in FPR 895.1, define the two conditions required in the abandonment of a forest road.

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- 3%    29. The Forest Practice Rules allow the Review Team how many days to examine a THP so as to assist the Director in determining if the plan is acceptable for filing as submitted? \_\_\_\_\_
- 5%    30. The use of WLPZs and other mitigations within a THP are intended to provide protection for numerous in-stream and near-stream site factors. List 5 of these site factors specified in the CA Forest Practice Rules.
- 3%    31. What characteristic of true fir requires that special attention be paid to it during partial cutting?
- 4%    32. How do the Forest Practice Rules define "economic feasibility"?
- 2%    33. For a GPS unit suitable for Forestry Purposes (e.g. Resource Grade unit), name two of the three types of X, Y, Z coordinates a point may be recorded in?

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- 4%      34. A 25-ton load of fresh wood chips is delivered to a biomass co-generation facility. The load of chips has a moisture content of 45%. How many dry weight tons in the load of chips?

**END OF QUESTION**

## QUESTION II - FOREST MENSURATION

### OBJECTIVE:

To determine your knowledge of several variable plot or fixed plot cruise characteristics, tree taper, and diagram rules.

**YOU MUST ANSWER THE QUESTIONS IN PART 1 OR PART 2 . YOU MUST ALSO ANSWER QUESTIONS 3, 4, 5 & 6.**

### QUESTION

#### **PART 1. VARIABLE RADIUS PLOT CRUISING**

You are to conduct a prism cruise using a 40 ft<sup>2</sup>/acre basal area factor (BAF) for a small parcel of land that you are considering for acquisition. The following data were obtained from three randomly located horizontal sample prism points in this parcel. Basal area and volume were recorded for tallied trees.

Point No.	"In" Tree Number	Tree Basal Area (sq. ft)	Volume (cu. ft)
1	1	3.40	203.0
	2	2.18	130.0
	3	1.23	60.0
2	1	0.55	21.8
	2	4.91	225.0
3	1	0.35	10.5
	2	2.64	175.0
	3	4.27	225.0
	4	5.94	250.0

(Reminder: Tree Factor = BAF / BA of "in" tree)

**(Show your formulae and calculations - you may receive partial credit even if the answer is not absolutely correct.)**

15%      A. Calculate the best estimate of average basal area (sq.ft./acre) for this parcel.

30%      B. What is the best estimate of average volume per acre in the stand?

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**OR**

**PART 2. FIXED RADIUS PLOT CRUISING**

20% A. Discuss in detail the concept of standard deviation and coefficient of variation as they relate to fixed radius plot cruising. Illustrate with examples.

25% B. Discuss in detail the concepts of sampling error and probability as they relate to fixed radius plot cruising. Illustrate with examples.

**APPLICANTS- REGARDLESS OF WHETHER YOU ANSWERED PART 1 OR PART 2, YOU MUST ANSWER THE REMAINING QUESTIONS:**

15% 3. A. Briefly explain why, in addition to the use of volume tables in an inventory, a forester may need tree taper information.

5% B. Additionally, describe two ways of obtaining tree taper.

4. The Scribner Decimal-C log rule is a diagram rule.

10% A. Explain the term diagram rule.

10% B. When scaling small logs (12" DIB), is there commonly overrun or underrun when using the Scribner Decimal-C log rule. Why?

15% 5. You are considering acquisition of a small parcel of timbered property. Explain how a local mill overrun or underrun would affect the selling value of stumpage from your acquisition.

**END OF QUESTION**

### QUESTION III-FOREST ECOLOGY

**OBJECTIVE:**

To determine your knowledge of some of the ecological-biotic conditions and processes within the forest soil.

**QUESTIONS:**

30% 1. Root diseases can be caused by both biotic and abiotic factors. They are often thought of as detrimental features in the management of forest stands. However that assumption may not always be correct. Discuss three possibly **beneficial** aspects root diseases may have in the ecology of a forest.

10% 2. Discuss damping-off and what role it plays in forest regeneration. Include in your discussion forest and nursery environments as they relate to damping-off.

20% 3. You can often identify fungal-caused root diseases by observing the infected tree's symptoms and signs.

A. Give the common or scientific names of 3 fungal root diseases found in western US conifers.

B. What are the differences between symptoms and signs of root disease?

4. For the 3 diseases you listed in question 3, **select 2** and briefly discuss the following:

10% A, What specie(s) of trees are most commonly attacked by the disease?

20% B. Give two examples of symptoms **and** two examples of signs for the 2 common root disease found on western conifer species that you selected in Part A of this question.

10% 5. Define mycorrhiza and discuss their function and significance relating to forest trees and artificially grown nursery stock. Be specific

**END OF QUESTION**

## **QUESTION IV-SILVICULTURE**

### **OBJECTIVE:**

This question is to determine your ability to assess the genetic characteristics of a forested area and develop a tree improvement program.

### **SITUATION:**

You are involved with the management of 50,000 acres of cutover timberland located in California known as the Home Tree Farm. The landowner has decided that the Home Tree Farm will be managed intensively through even-aged management. To meet your client's goal you suggest the development of a tree improvement program. The existing stands were cut using the diameter limit method (high grading) ten to forty years ago. You suspect the genetic quality of the remaining stands is lower than that of the properties adjacent to, and intermingled with, the Home Tree Farm. The neighboring landowners are the U.S. Forest Service, industrial ownerships, and non-industrial private owners.

### **QUESTION:**

15% 1. Using a major California forest type having at least three commercial species, describe the general stand structure you would expect to find throughout the tract and the genetic factors contributing to that structure.

15% 2. Describe the process you would use to determine the genetic quality of the existing stands.

20% 3. Assume your stands are lacking the genetic quality you desire. Describe your structure and composition **goals** for the existing stands and the future regenerated stands of the Home Tree Farm and itemize the factors you considered to arrive at those goals.

30% 4. Briefly discuss three (3) approaches you could take for your tree improvement program to ensure a future stand of higher genetic quality in both the first rotation and in future rotations.

20% 5. List five (5) economic factors you should consider to justify a tree improvement program and how those factors affect the cost effectiveness of your program.

**END OF QUESTION**

## QUESTION V- FOREST PROTECTION

### OBJECTIVE

To demonstrate knowledge of the role and effects of insects and diseases in forest stands.

### QUESTIONS

- 40%      1. Discuss **four** major ecological roles/effects of insects in forest ecosystems. Give examples.
- 20%      2. *Phytophthora ramorum*, a relatively new disease to California and Oregon forests, is known as Sudden Oak Death (SOD) disease. Briefly describe the environment and habitat where *P. ramorum* appears to thrive in California's forests. What ecological changes may occur if this disease spreads?
- 20%      3. Name the most important disease of sugar pine and western white pine in California. Discuss the life cycle and dynamics of this disease including environmental and biological interactions. You may use a drawn chart or table to aid your discussion.
- 20%      4. Early logging practices in the mixed conifer forests of the Sierra Nevada mountain ranges were highly selective for pines and many entries were made over time. Discuss what affect this logging had on the complex of insects and disease-causing pathogens in these forests that is apparent today.

END OF QUESTION

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**PART II**

**Applicant Must Answer Three Of The Remaining  
Five Essay Questions In Part II**

Question VI-Forest Engineering  
Question VII-Forest Economics  
Question VIII-Forest Administration  
Question IX-Forest Policy  
Question X-Forest Management

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## **QUESTION VI-FOREST ENGINEERING**

### **OBJECTIVE**

To determine your understanding of forest engineering activities related to harvesting and associated land management activities.

### **QUESTION**

1. Tractor, Highlead, Skyline, Cut-to-Length Harvester, and Helicopter Yarding are five of the harvesting systems that may be considered in developing the logging plan for a Timber Harvesting Plan.

15% A. Briefly discuss each of these yarding systems as to their suitability for a partial-cut harvest. Also discuss any terrain limitations that may preclude the system's use or severely limit its use. If certain equipment or techniques are required to do a partial-cut harvest, be sure to describe this equipment.

20% B. List two (2) ways each logging system might cause potential damage to resources and include one reasonable mitigation of that potential damage.

20% C. For each harvesting system, discuss two advantageous circumstances which would favor that logging system and the relative economic factor(s) which would favor the use of each system for partial cutting.

2. The state of California has a Surface Soil Erosion Hazard Rating system with which RPF's should be familiar.

4% A. State the four significant factors which are used in the development of the rating.

6% B. Give a brief description of the process for arriving at the rating.

20% C. Assuming a timber harvest unit has an Extreme EHR, give four (4) possible THP regulatory impacts on road design-construction and four (4) possible THP regulatory impacts on the choices and implementation of silvicultural/harvesting methods?

3. Today most larger forest landowners are implementing Road Management Plans (often called "legacy road plans") [FPR Article 6.9, Sec. 1093] to decrease soil erosion and improve water quality for salmonid habitat betterment.

5% A. Describe what is meant by a "legacy road plan"

10% B. List and briefly discuss five (5) methods, techniques, or management changes which are commonly being included in such legacy road plans.

### **END OF QUESTION**

## **QUESTION VII-FOREST ECONOMICS**

### **OBJECTIVE**

To evaluate your understanding of the relationship of value to specific variables under a particular management regime.

### **SITUATION**

Many contemporary resource management projects involve decisions regarding the harvest, retention or manipulation of forest vegetation. In making management recommendations it is important for an RPF to understand the relationship between value and resource elements.

### **QUESTION**

1. For any important commercial forest tree species grown in California:
  - 10% A. Draw a graph illustrating what you consider to be a typical relationship between STUMPAGE VALUE PER MBF LOG SCALE (vertical axis) and DIAMETER AT BREAST HEIGHT (horizontal axis).
  - 25% B. Discuss the dynamics of, and reasons for, what occurs along the curve you have drawn.
- 35% 2. The SHAPE of the curve (relationship between VALUE and DBH) will change over time with changes in forest product prices, logging costs, processing costs etc. Discuss IN DETAIL what forces might lead to substantial changes in the shape of the curve.
3. Financial Maturity
  - 15% A. Explain how the concept of financial maturity works when making decisions on the harvesting of EVEN-AGED timber stands.
  - 15% B. Explain which economic factors, other than financial maturity, would be important in a "real world" situation of a timberland owner deriving income by selling stumpage from a 10,000 acre tract. (Do not consider the case of an owner who processes his own timber.)

### **END OF QUESTION**

## QUESTION VIII- FOREST ADMINISTRATION

### OBJECTIVE:

The administration of a forest involves the understanding and integration of numerous terms and concepts. This question will evaluate your understanding and relationship of concepts integral to understanding the administration of a forest for commercial wood production.

### QUESTIONS:

- 25% 1. Define and briefly discuss the term, Forest Regulation, its meaning, application and relevance to today's forestry. (Note: The question refers to the term in regards to producing regular sustained yields of timber, not to rules and regulations such as found in Forest Practice Regulations).
- 25% 2. Define, compare and contrast Area Regulation and Volume Regulation. Also illustrate their operational differences when applied in practice (versus theory) to today's real-life forests.
- 25% 3. Explain the procedure and goals in converting an Unregulated natural or previously unmanaged forest into a Regulated, Normal Forest. Be sure to define terms and concepts used and point out where and why theory may depart from real-life circumstances in today's forest management.
- 25% 4. Define the terms Rotation and Cutting Cycle. Discuss how the definitions may apply to an All-aged forest versus an Even-aged forest.

**END OF QUESTION**

## **QUESTION IX- FOREST POLICY**

### **OBJECTIVE**

To demonstrate your awareness of issues which can influence the balance of growth and harvest in sustained yield management decision-making situations.

### **SITUATION**

As California RPFs, you are required to manage a client's forestland by 14 CCR 913.11, 933.11 or 953.11 that states (in part):

“The goal of this section is to achieve Maximum Sustained Production of High Quality Timber Products (MSP).”

For this question, assume that sustained yield is synonymous with sustained production and has a basic definition of "growth equals harvest".

However, other factors and issues that may be classified as physical/biological and social can influence the actual level of sustained yield. These factors can tip the balance toward either the growth or harvest side of sustained yield with resulting changes in residual inventory. In the policy making process, consideration of these factors can also exert pressures that may tip the balance towards either the growth or harvest side of the sustained yield equation. In terms of sustained yield, you should be aware of the costs and benefits associated with timberland ownership. Regulatory policies may also ultimately affect the balance of growth and harvest.

### **QUESTION**

40% 1. LIST five (5) issues that you believe are physical/biological and five (5) social issues that are pressures or forces that can create an imbalance in the sustained yield equation. Briefly indicate why you consider each issue to be either a physical/biological or social issue.

60% 2. From your list for Question 1, select two social AND two physical/biological issues and discuss in more detail how they create pressure on the sustained yield equation, the costs and benefits (biological, social, financial etc.), and how you might adjust for that pressure over time.

### **END OF QUESTION**

## **QUESTION X- FOREST MANAGEMENT**

### **OBJECTIVE**

To assess your understanding of specific factors influencing harvesting operations and soil productivity.

### **SITUATION**

Organic matter loss, surface soil loss and soil compaction are primary factors influencing soil productivity that can be affected by harvesting operations utilizing ground-based equipment.

### **QUESTION**

- 25%            1. Describe how each of the factors given above influences soil productivity.
- 25%            2. Describe how projects involving heavy equipment can affect organic matter loss, surface soil loss, and soil compaction in a manner that reduces soil productivity. Be specific and give examples.
- 30%            3. List and describe two management practices for each of the factors that could be used to prevent or mitigate the negative impacts on soil productivity.
- 20%            4. Describe how growing space may be lost as a result of harvesting projects and explain how this may lead to impacts on resource productivity. Also, describe two management practices that could be used to prevent or mitigate the negative impacts of growing space loss.

**END OF QUESTION**

**END OF EXAMINATION**